When Spencer is compared with other great thinkers, he stands distinguished by the immense range of his knowledge of the facts and principles of the sciences and by that wonderful power of generalising their laws which was the instrument by means of which he sought to unify them in one grand scheme of thought. It is true that the specialist may discover shortcomings in his treatment of each one of those sciences, not less in the psychology, in which he is acknowledged as a master both of principles and of details, than in his biology and sociology; and it is true that certain of his great generalisations, for example, the ancestral-ghost-theory of the origin of religions, cannot now be regarded as well founded. Nevertheless, he has contributed to each of these sciences a wealth of illuminating and suggestive ideas, and even those of his hypotheses that have proved untenable have done so great service in provoking thought and discussion that, had he given to the world these unsuccessful suggestions only, he would still have had a great claim upon our gratitude.

On contemplating the completed System of Synthetic Philosophy there is a certain pathos in the fact that the final volumes, to which Spencer had long looked forward as the consummation and crown of his life's labour, namely, those setting forth the principles of ethics, are perhaps generally felt to be the least convincing part of the whole, a feeling which, it can hardly be doubted, was shared by the great thinker himself. But, whatever may be the final verdict as to the value of Spencer's ethical philosophy, there can be no difference of opinion as to the great moral value of his own life. He gave us an example, all too rare and too sorely needed in these days, of a life strenuously devoted through all the years of maturity and age to the realisation of a great object, the spectacle of a man working on with steadfast purpose, unmoved alike by the neglect and by the acclamation of the world, "Voyaging through strange seas of thought, alone" towards the lofty heights of Thought whose dim and cloud-capped towers had caught and fixed his eager youthful gaze.

Spencer's writings may seem to some readers cold and lacking in emotional fervour, and the man himself a little wanting in human sympathies; but can it be doubted that so grand an effort was sustained throughout the arduous years by a deep feeling for the mystery and pathos of the life of man, that tiny organism endowed with the capacity for thought and set to wonder, to labour, and to hope among the spheres that roll for ever through infinite space?

If it could be ascertained what parts of all Spencer's work do, and will, appeal most deeply to great numbers of thinking men, they would probably be found to be, firstly, the demonstration of the Unknowable Mystery that must for ever elude our grasp as the bounds of knowledge are thrown ever wider and wider, and secondly, the doctrine of Transfigured Realism that gives to the mind, painfully halting between the vain imaginings of the pure idealists and the shallow teachings of the materialists, a firm and sane standing-ground from which to view the two great orders of being, the internal and the external worlds.

Much of Spencer's way of thinking and many of his ideas have become a part of the very atmosphere we breathe and cannot but accept, and much of his work must form a part of every future system of philosophy that shall attempt the unification of the sciences. His fame is secure, for posterity can never forget that in an age in which men's minds were oppressed, and in danger of being overwhelmed, by the rapidly growing wealth and complexity of their knowledge of the phenomenal world, Spencer generalised boldly and effectively, breathing life into the dead bones of science.

NOTES.

THREE Nobel prizes for science have been awarded as follows:—for physics, Prof. Henri Becquerel divided with M. and Mme. Curie; for chemistry, Prof. Arrhenius; and for medicine, Prof. Finsen. The formal distribution of the prizes took place on Thursday, December 10, in the presence of the King of Sweden and several members of the Royal family and a distinguished gathering. It is announced that Prof. Finsen has decided to give 50,000 kroner (2753*l.*) from the amount awarded to him to the Phototherapeutic Institute at Copenhagen, and that two members of the governing body will each present it with a like sum.

MR. BRUCE, the leader of the Scottish Antarctic Expedition, which was sent out last year on board the *Scotia*, has arrived at Montevideo from the Falkland Islands. He reports that all is well on the *Scotia*, which is on the way to Buenos Ayres. Six men have been left behind in charge of a meteorological station. The meteorological station referred to is evidently the station set up by Mr. Bruce at Cape Pembroke, Falkland Islands, before the *Scotia* left for the southern seas in January last.

IT is announced that Dr. Oscar Guttmann has presented to the Chemical Society a photograph of the portrait of Roger Bacon in possession of Lord Sackville at Knole House, Sevenoaks.

DR. HANS GADOW, F.R.S., has, we learn from *Science*, accepted an invitation of the Lowell Institute, Boston, to give a course of six lectures, beginning March 29, 1904, on "Coloration of Amphibians and Reptiles." Dr. Gadow will probably give other popular lectures on zoological subjects while he is in America.

IT is reported in *La Nature* that Baron Edmond de Rothschild has sent 20,000 francs to M. Albert Gaudry, president of the Paris Academy of Sciences, to make it possible for the Museum of Palæontology to secure the very precious specimens of the Filhol collection which were obtained from the Quercy phosphate beds.

ON November 28 about three hundred teachers met at New York to form an Association of Teachers of Mathematics in the Middle States and Maryland, the prime object of which is the improvement of mathematical teaching. Prof. David Smith, of the Teachers' College, was elected president of the Association; Prof. H. B. Fine, of Princeton University, vice-president; and Dr. Arthur Schultze, of the New York High School of Commerce, secretary. After President Butler, of Columbia University, had delivered the address of welcome, papers on various aspects of mathematical teaching were read by Mr. Harry English, of Washington, D.C., Mr. Isaac N. Failor, of Richmond Hill, Dr. Arthur Schultze, and Mr. J. L. Patterson, of Philadelphia. The next meeting of the Association will be held at Columbia University, New York City, about next Easter, and applications for membership and other communications may be addressed to Dr. Schultze, No. 4 West 91st Street, New York City.

HIS MAJESTY THE KING has presented a fine stag to the University College of North Wales for its zoological museum. The animal has been specially selected for the college collection, and will illustrate fully the characters of the red deer. Prof. White has had the stag sent to Mr. Edward Gerrard, of Camden Town, to be mounted. The following gifts have reached the college during the past few weeks:—Mr. Assheton-Smith, specimens of the guanaco, St. Kilda sheep, Australian swan, goshawk, grouse, and rhea; Mr. Herbert C. Hodson and Mr. James M. Reid, bloodhounds; Dr. Corbet W. Owen, nests of the African weaver bird; Mr. Hugh O. Hughes, specimen of guano from the Chincha Islands; Mr. H. S. Forrest, small collection of fishes, &c.; Mr. J. Pugh, a fine pike; the Rev. W. S. White, small collection of bird and bat skins. Prof. White has also received a second gift of 10*l.* from Mr. Henry R. Davies for the zoological museum.

THE annual dinner of the Institute of Chemistry was held on Monday night, with Mr. David Howard, the president, in the chair. The president, in responding to the toast of the Institute, proposed by Lord Justice Cozens Hardy, remarked that the application of chemistry in our industries was a national question. Most of the successful manufacturers in Germany whom he knew were doctors of philosophy and very well educated men, who had, in addition, devoted their lives to the study of every detail of their work. It must be realised in England that the technical chemist should be at least as well educated and thoughtful as his German friends. The Institute was now considering what could be done to direct the studies of men engaged in technical work, for, while his general training must not be diminished, a technical chemist could not have too high a scientific training. Mr. Haldane proposed the toast of "Prosperity to Science and to Scientific Industries." He remarked that as a nation we needed science. It was not that we were going back; the general average was higher than ever before, and it behoved us to see that we kept our place. We needed science in our Government, in our industries, in our education. The time, then, had surely come when more science should be instilled into national methods. Why should not the grants to the university colleges, and to colleges giving scientific teaching of a university type, be increased? Any Government would be glad to do that if it felt that there was something like organised public opinion at its back. Then we suffered in England from a want of enthusiasm for science on the part of our manufacturers, and little progress could be made until this was remedied.

A PAPER, entitled "The Metrical System of Weights and Measures," was read by Mr. Alex. Siemens at the Royal Statistical Society on Tuesday. The author expressed his conviction that, though scientific men had for some time previously been discussing the subject in a general way, there is little doubt that the present metrical system is the result of the agitation of James Watt, who took the subject up in the year 1783. The history of the question in this country was traced from the year 1824, when Parliament was first approached on the subject. Last year the Liverpool Cotton Association effected the change from the binary to the decimal system of quotation, and Mr. Siemens showed how practically useful the 2000 lb. ton and other forms of reckoning on the decimal system had proved in the United States and Canada, as, indeed, in many British dependencies. In France the metric system was not really legal to the exclusion of every other until January 1, 1840, that is to say, a little more than sixty years ago. To-day only one system of measures exists in that country, and it is absolutely incorrect to say that the old measures are still employed there; even their values are becoming more unknown. The only notable exception is to be found in those industries or trades in which foreign nations which have not adopted the metric system have such a preponderating influence as to, thus far, impose the use of their own measures. Even in Germany, where the metric system has been in use not much more than half as long as it has been in France, though a few old names of weights and measures are in use, they really denote metrical measures, and may be treated as local expressions only. As regards the expense of the change, Mr. Siemens denied the suggestion that our engineering machinery for screw cutting would have to be scrapped—all that would be necessary would be to buy suitable exchange wheels. The author finally expressed his opinion that not only our own dependencies, but other nations would follow our lead if we made the change, and that thus international unity of weights and measures would at once become an accomplished fact.

THE Bradshaw lecture was delivered before the Royal College of Surgeons on December 9 by Mr. Henry Morris, the subject being "Cancer and its Origin." An admirable survey of the various theories of the nature of cancer is given, such as the "lost balance theory" of Thiersch, adopted by some recent writers, *e.g.* Foulerton, the "tumour-germ theory" of Cohnheim, and the various parasitic theories. Mr. Morris does not look with favour upon the parasitic theories; he says, "neither fission fungus, yeast fungus, nor psorosperm—neither bacterium, blastomycete, nor protozoon—has up to the present moment been satisfactorily shown, in spite of years of patient study by many skilled workers, to be in any sort of causal relation to the disease." He believes that there is "one theory which is more consistent than any other with all that we know about malignant disease, which fully explains the origin of very many non-malignant tumours," this being Cohnheim's "tumour-germ theory," which states that tumours originate from a matrix of embryonic cells which during fœtal life are cut off from their proper connections. Mr. Morris discusses the evidence for and against this theory, and the practical outcome should it be proved to be true.

ANOTHER example of the practical utility of wireless telegraphy at sea was afforded the other day as a result of the accident which happened to the *Kroonland* on her way from Antwerp to New York. The steamer disabled her steering gear when west of the Fastnet and was obliged in consequence to abandon her journey. Not only was the captain able to communicate particulars of the accident at once to the agents of the American line at Antwerp and to receive (in less than an hour and a half) instructions as to how to proceed, but the passengers were enabled to send messages to their friends and relatives assuring them of their safety. A large number of passengers made use of the wireless telegraphy installation, some telegraphing for more money, which was wired to them per the purser. The wireless installation on the *Saxonia* was useful in another way a short time back; getting into communication with the *Campania,* the latter informed the *Saxonia* that berths were waiting for English-speaking emigrants as motor-men on the surface lines of New York. These two instances serve to show the benefits that wireless telegraphy confers on travellers by sea.

THE fourth report of the National Electric Light Association's committee for the photometry of arc lamps contains some interesting results of measurements of the light distribution and mean spherical candle-power of the American pattern Nernst lamps. These lamps are made with one, three, six or more glowers in parallel; the measurements of the committee were made on the first three of these types. They show that the light distribution below the horizontal is very good, but above it is very poor. The distribution in the horizontal plane is fair; thus with the six-glower lamp the maximum horizontal candle-power is 112, the minimum only about 40 candles; the mean horizontal candle-power is 85 candles. For the same lamp the mean spherical candle-power is approximately 170 candles, and the mean hemispherical candle-power for the lower hemisphere 290 candles. The maximum candle-power is 400 candles in a direction vertically downwards. It will therefore be seen that the efficiency varies very greatly according to the direction in which the candle-power is measured. Taking the mean spherical candle-power, which is the only value of any use for comparative measurements, the consumption of power comes out to 3·3 watts per candle; for the mean hemispherical it is 1·9, and for the mean horizontal 6·6 watts per candle. If, however, the measurement be made in the direction of maximum candle-power, the consumption of power is only 1·3 watts per candle. The general distribution of the light and the values of the mean and maximum candle-powers show that this lamp is on a par with a small (six to eight ampere) arc as a source of illumination.

WE have received further copies of the *Journal* of the Meteorological Society of Japan (for September and October last), containing papers on the climatology of Formosa and other important subjects relating chiefly to Japanese meteorology. The articles are all in Japanese, but the promise of issuing some in European languages is reiterated. We look forward with pleasure to the fulfilment of the promise, as the proceedings of this energetic society will doubtless be of much interest to our readers.

THE weather for the present month is proving very disappointing, and, after a few days with somewhat low temperatures at the commencement, the conditions have again become cyclonic with the usually accompanying mild and damp south-westerly winds blowing from off the relatively warm waters of the Atlantic. Disturbances are again reaching us with considerable frequency, and the rains which are occurring over the whole country are considerably augmenting the already excessive falls for the present year. At Greenwich the fall for 1903 is now approximately 35 inches, and is about an inch in excess of any previous annual record during the last sixty years. The storm areas which have arrived over us recently have had the barometer as low as 29 inches, and gales have been experienced at many places in exposed positions on our coasts.

A CORRESPONDENT sends us an extract from a letter describing an aurora observed at Calgary, Canada, on October 31, when auroral displays were seen in many parts of the world (see this vol. p. 9). At Calgary a peculiar light was noticed in the sky about 6.30 p.m. Large and beautiful vertical shafts of coloured light were first seen moving about the sky. "Presently the shafts began to lower, vastly increased in size and number, until their lower tips touched the ground (objects about half a mile off could be seen through them) and the upper tips met in the zenith, losing themselves among the stars directly overhead. They formed a perfect apse, bright ruby above, and coming through purple and greenish tints to gold at the bottom. The apse shivered and shook out all sorts of colours, and literally chased me in the buggy, the nearer huge shafts being but a few yards off. A horse in a field alongside tore madly round in terror. A few minutes later there were only a few stray but grand shafts left."

SOME experiments on the influence of a magnetic field on a tuning fork are described by Mr. O. Kirstein in the *Physikalische Zeitschrift,* and lead to the results that if the lines of force are perpendicular to the plane the frequency is increased; if parallel it is diminished; at an angle of 45° no change occurs; the decrease in the second case is greater than the increase in the first; the changes are in every case proportional to the field, and the action of the magnetism is only temporary. These results, some of which agree with previous investigations, have an important practical application in connection with electrically excited tuning forks.

THE frequent use of silk suspension fibres in physical laboratories renders the determination of the elastic constants of silk a problem of considerable interest. This problem forms the subject of a paper by M. F. Beaulard in the *Journal de Physique,* in which hysteresis curves are drawn showing the elongations produced by traction. The most remarkable conclusions drawn are, firstly, that the curve ultimately tends to become a straight line, the hysteresis then vanishing; and, secondly, that the value of Poisson's ratio, calculated from observations of the behaviour of the fibre under traction and torsion, is about 1·56, and this high value supports the view that silk is not isotropic.

A GRACEFUL tribute to the venerable Japanese botanist, Ito Keisuki, is paid by Mr. Botting Hemsley by the establishment of a new genus of the Bixineæ under the name Itoa. Dr. Tokutaro Ito, who is associated with his grandfather in the compliment, has followed in the paths of his illustrious ancestor in his systematic contribution entitled "Plantæ Sinenses Yoshianæ."

IN 1894 Prof. Carmody published a summary of the industrial resources of the island of Trinidad, and in a small pamphlet recently issued he uses this as a basis of comparison with the conditions and general trade returns of the island for the year 1902–3. The principal export, sugar and sugar products, has, of course, decreased considerably, but there is a balancing increase in the amount of cacao. Another important product is that of asphalt, which has also steadily increased in amount. A striking feature of the statistics is the rising value of imports from Canada.

THE Barbados *Agricultural Reporter* of November 18 contains a report of a meeting of the Legislative Council of the island at which it was resolved to offer rewards for the destruction of mongooses. With this, it may be hoped, we shall soon hear the last of an ill-starred experiment in acclimatisation.

A CIRCULAR has recently been issued by Messrs. Stejneger and Miller, the well-known American naturalists, urging the governing body of the Carnegie Institution to undertake a thorough and detailed biological survey of the eastern Holarctic region, on the plan followed by Dr. C. H. Merriam in the United States. Despite the gigantic nature of this undertaking, it is estimated that it might be completed within ten years.

AMONG several other articles in the *Journal* of the Quekett Microscopical Club for November, we may refer to one by Mr. W. H. Harris on the emission of musical notes by the hover-flies of the genus Eristalis, and on the habit from which they take their name. It appears that the thoracic spiracles of these insects carry a couple of crescentic chitinous rods joined by a ligament, so as to form a bow. A large bundle of muscles is attached to these rods, which supports a number of delicate membranes pleated in a complex manner. The air-chamber is kept inflated by the movements of the fly, and the musical notes are apparently produced by bringing the pleated edges of the membranes close together and expelling, by muscular action, the air from the chamber with sufficient force to set them vibrating.

We have received from Mr. E. B. Waggett a communication with reference to a proposed method of graphically indicating the duration of the residence in the British Islands of the various members of the bird-fauna. On a sheet of ruled paper two large dots, an inch apart, are marked on four of the ruled lines, the dot on the left indicating New Year's Day, and the one on the right December 31. In the case of permanent residents, the two dots are connected by a line. Winter visitors are indicated by drawing a line half an inch long on each side of the right dot, the extremities of these lines being marked above by arrow-heads, of which the one on the left points downwards, to indicate a southern migration, while that on the right points in the opposite direction, and thus implies a northern flight. Summer visitors, on the other hand, are indicated by a half-inch line midway between the two dots, with arrows on the lower side of the extremities, the direction of which indicates the migration. Species which merely rest for a short time in Great Britain during the spring and autumn migrations are indicated by drawing two quarter-inch lines some distance on each side of the right dot, with an arrow both above and below each to mark the direction of the migration. Modifications of these may be easily drawn to indicate residents which build twice, or even thrice, in a season, and also resident species building in the spring which are reinforced in autumn by migrants from the north for the winter season.

In the January number of the *Psychological Review* the tenth anniversary of the journal will be celebrated by the founding of a special literary section, to be published monthly, in which fresh, prompt treatment will be given to the literature of psychology, philosophy, and cognate subjects.

Messrs. J. and A. Churchill have now published separately the second part of "Elementary Practical Chemistry," by Dr. Frank Clowes and Mr. J. B. Coleman. The present publication is divided into three sections, dealing respectively with qualitative, volumetric, and gravimetric analysis.

The Huxley lecture for 1903, by Prof. Karl Pearson, F.R.S., "On the Inheritance of the Mental and Moral Characters in Man, and its Comparison with the Inheritance of the Physical Characters," has now been published separately by the Anthropological Institute. It will be remembered that we published an abstract of Prof. Pearson's lecture in our issue for October 22.

Mr. W. C. Fletcher, head master of the Liverpool Institute, has been appointed to the newly-established post of chief inspector of secondary schools. Mr. C. A. Buckmaster, acting senior chief inspector at South Kensington, has been appointed chief inspector of schools under the branch of the Board of Education which deals with evening schools, technology, and higher education in science and art.

The fourth volume of the "*Knowledge* Diary and Scientific Handbook" has now been published, and in this 1904 issue there is much information which will prove of use to men of science. Among many interesting contents may be noticed the numerous practical articles, which include one by Mr. William Marriott on practical meteorology, and one by Mr. Edwin Edser on the optical constants of lens combinations. The tables, too, are abundant and well selected.

We have received a copy of Prof. Robert Wallace's opening lecture of the session on October 13 to the students of the department of agriculture and rural economy at the University of Edinburgh. The lecture is entitled "Agriculture, Live Stock, and Dairying in Argentina," and deals with Prof. Wallace's observations and inquiries during his recent six months' tour in South America. The booklet is published by Messrs. Oliver and Boyd at ninepence.

The issue of "Who's Who" for 1904 contains above one hundred and fifty pages more than that for 1903, and the increase in size indicates the large number of additional biographies now included. The notable persons whose biographies are given are not exclusively British, for particulars are provided also of American men and women of eminence. Messrs. A. and C. Black are to be congratulated upon the general appearance of the book, and the editor upon the excellence of its arrangement. The price of the 1904 edition is 7*s.* 6*d.* net.

Many of our readers are acquainted with those excellent volumes of "Photograms" (Messrs. Dawbarn and Ward, Ltd., London) which have appeared yearly since 1895. The issue for the present year surpasses, if possible, the high standard which this publication had reached, and our photographic readers will find in these pages much that will be of interest. As a pictorial and literary record of the artistic photographic work of the year the compilers and publishers are to be congratulated, for the volume is high-class in every respect.

The first number, that for November, of the *Central,* a magazine edited on behalf of the City and Guilds of London Central Technical College Old Students' Association by Dr. E. F. Armstrong and Mr. Maurice Solomon, is an excellent performance. It is attractively produced, well illustrated, and interestingly written. There is an instructive article on oscillographs by Mr. Solomon, a description of the new electrical laboratories by Mr. Joseph Griffin, and an unusually large number of notes concerning the work and doings of old students; one section of these notes, dealing with chemical research, is conclusive evidence that the atmosphere of the Central Technical College is favourable for the development of investigators; and the new magazine shows that literary as well as scientific enterprise is encouraged.

In a paper read recently before the Church Society for the Promotion of Kindness to Animals, the Hon. Chas. S. Rolls remarked that at the present time those who were seeking to develop motors and motoring were experiencing exactly the same opposition from many rural communities as the promoters of railways met with earlier. Having disposed of many thoughtless and amusing objections brought against motor vehicles by opponents, he remarked that, as regards other objections, it should be remembered that the difficulties of noise, vibration, smell, and untrustworthiness must eventually be, and are rapidly being, overcome. This country has, said Mr. Rolls, been infested with a host of inferior cars, consequently these objections have been more apparent here than they are on the Continent or in America. The introduction of the motor-car will, undoubtedly, constitute the means of better intercommunication, which has always been the chief factor of civilisation. It will result, too, in the decrease of wear and tear on the roads, greater economy of space in the streets, and especially a greatly increased cleanliness of the latter.

The additions to the Zoological Society's Gardens during the past week include a Brown Capuchin (*Cebus fatuellus*) from Guiana, presented by Mr. F. J. Holmes; two Tantalus Monkeys (*Cercopithecus tantalus*) from West Africa, a Globose Curassow (*Crax globicera*) from Central America, two Brazilian Tanagers (*Ramphocoelus brasilius*) from Brazil, a Tytler's Parrakeet (*Palaeornis tytleri*) from the Andaman Islands, deposited.